

AMENDMENTS TO THE CLAIMS

Please replace the pending claims with the following claim listing:

1. **(Currently Amended)** A wavelength-division multiple access system having a center apparatus (OLT), n optical network units (ONU), and m ONUs arranged via a wavelength multi/demultiplex apparatus, the OLT and the wavelength multi/demultiplex apparatus being connected together in a multiplex section via multiplex section optical fibers, the wavelength multi/demultiplex apparatus and the ONUs being connected together in an access section via access section optical fibers, downlink optical signals from the OLT to the ONUs and uplink optical signals from the ONUs to the OLT being transmitted through the multiplex section using wavelengths assigned to the respective ONUs while multiplexing the wavelengths, the wavelength multi/demultiplex apparatus carrying out wavelength multiplexing or demultiplexing for bidirectional transmissions,

~~characterized in that~~ wherein a wavelength band Da (wavelengths λ_{d1} to λ_{dn}) for downlink optical signals corresponding to the n ONUs, a wavelength band Ua (wavelengths λ_{u1} to λ_{un}) for uplink optical signals corresponding to the n ONUs, a wavelength band Db (wavelengths λ_{dn+1} to λ_{dn+m}) for downlink optical signals corresponding to the m ONUs, and a wavelength band Ub (wavelengths λ_{un+1} to λ_{un+m}) for uplink optical signals corresponding to the m ONUs are set different from one another, the wavelength bands Ua and Ub are set adjacent to each other, and the wavelength bands Ua and Da or the wavelength bands Ub and Db are set adjacent to each other,

said OLT comprises:

means for multiplexing said downlink optical signals multiplexed in the wavelength band Da (wavelengths λ_{d1} to λ_{dn}) and said downlink optical signals multiplexed in the wavelength band Db (wavelengths λ_{dn+1} to λ_{dn+m}) and then transmitting to the multiplex section optical fibers; and

means for demultiplexing the uplink optical signals transmitted via the multiplex section optical fibers into said uplink optical signals multiplexed in the

wavelength band Ua (wavelengths λ_{u1} to λ_{un}) and said uplink optical signals multiplexed in the wavelength band Ub (wavelengths λ_{un+1} to λ_{un+m});
said wavelength multi/demultiplex apparatus comprises:

means for demultiplexing the downlink optical signals transmitted via the multiplex section optical fibers into said downlink optical signals multiplexed in the wavelength band Da (wavelengths λ_{d1} to λ_{dn}) and said downlink optical signals multiplexed in the wavelength band Db (wavelengths λ_{dn+1} to λ_{dn+m}); and

means for multiplexing said unlink optical signals multiplexed in wavelength band Ua (wavelengths λ_{u1} to λ_{un}) and said unlink optical signals multiplexed in wavelength band Ub (wavelengths λ_{un+1} to λ_{un+m}) and then transmitting to the multiplex section optical fibers; and

each of the ONUs comprises:

downlink optical signal receiving means for receiving a downlink optical signal of one of the wavelengths λ_{d1} to λ_{dn+m} in the wavelength bands Da and Db which wavelength is assigned to the ONU; and

uplink optical signal transmitting means for transmitting an uplink optical signal of one of the wavelengths λ_{u1} to λ_{un+m} in the wavelength bands Ua and Ub which wavelength is assigned to the ONU or an uplink optical signal within a broad band including the wavelength bands Ua and Ub.

2. **(Currently Amended)** An optical wavelength-division multiple access system according to Claim 1, characterized in that wherein the wavelength bands Da and Db for the downlink optical signals and the wavelength bands Ua and Ub for the uplink optical signals are set on the wavelength axis in order of

the wavelength bands Da, Ua, Ub, and Db or

the wavelength bands Db, Ub, Ua, and Da.

3. **(Currently Amended)** An optical wavelength-division multiple access system according to Claim 1, ~~characterized in that~~ wherein the wavelength bands Da and Db for the downlink optical signals and the wavelength bands Ua and Ub for the uplink optical signals are set on the wavelength axis in order of

the wavelength bands Ua, Ub, Db, and Da or

the wavelength bands Da, Db, Ub, and Ua.

4. **(Currently Amended)** An optical wavelength-division multiple access system according to Claim 1, ~~characterized in that~~ wherein the wavelength bands Da and Db for the downlink optical signals and the wavelength bands Ua and Ub for the uplink optical signals are set on the wavelength axis in order of

the wavelength bands Ub, Ua, Da, and Db or

the wavelength bands Db, Da, Ua, and Ub.

5. **(Currently Amended)** An optical wavelength-division multiple access system according to Claim 1, characterized in that wherein

a connection is made to each ONU in the access section via two access section optical fibers,

the OLT is configured to multiplex the ~~wavelengths of and transmits optical carriers~~ for uplink signals uplink optical carriers in the wavelength bands U_a and U_b (wavelengths λ_{u1} to λ_{un+m}) and the downlink optical signals in the wavelength bands D_a and D_b (wavelengths λ_{d1} to λ_{dn+m}) and to transmit to the multiplex section optical fiber,

the wavelength multi/demultiplex apparatus is configured to ~~separate the optical carriers for uplink signals from the downlink optical signals, the optical carriers for uplink signals and the downlink optical signals being input via the multiplex section optical fiber and having the wavelengths corresponding to the ONUs, to output the resultant signals to the ONUs via one of the access section optical fibers, and to multiplex the uplink optical signals input through the other access section optical fiber and having the wavelengths corresponding to the ONUs, to output the resultant signals~~ demultiplex the uplink optical carrier and the downlink optical signal, each of the carrier and the signal having a wavelength corresponding to the ONU, from the multiplexed uplink optical carriers and the multiplexed downlink optical signals which are transmitted via the multiplex section optical fiber and to output the demultiplexed carrier and signal to each of the ONUs via one of the access section optical fiber, and further, to multiplex the uplink optical signals transmitted via the other of the access section optical fiber, each of the uplink optical signal having a wavelength that corresponds to the ONU and to output multiplexed uplink optical signals in the wavelength bands U_a and U_b (wavelengths λ_{u1} to λ_{un+m}) to the multiplex section optical fiber, and

each of the ONUs further comprises includes

a wavelength band multiplexer which is characterized by separating separates the wavelength bands U_a and U_b for the uplink optical signals from the wavelength bands D_a and D_b for the downlink optical signals and which separates an optical carrier for an uplink signal from a downlink optical signal, the optical carrier for the uplink signal and the downlink optical signal being input via the one of the access section optical fiber and having the wavelengths corresponding to the ONU, and an

uplink optical carrier from a downlink optical signal which are transmitted via the one of the access section optical fiber, the uplink optical carrier and the downlink optical signal having a wavelength corresponding to the ONU; and

an optical modulator which operates as the uplink optical signal transmitting means and which modulates the uplink optical carrier for the uplink signal separated by the wavelength band demultiplexer and having the wavelength corresponding to the ONU to transmit the resultant separated by the wavelength band demultiplexer and then transmits the modulated signal to the other access section optical fiber.

6. **(Currently Amended)** An optical wavelength-division multiple access system according to Claim 1, ~~characterized in that~~ wherein

a connection is made to each ONU in the access section via one access section optical fiber, and

each of the ONU further comprises ~~includes~~

a wavelength band demultiplexer which is characterized by separating the wavelength bands U_a and U_b for the uplink optical signals from the wavelength bands for the downlink optical signals ~~and which outputs, to the downlink optical signal receiving means, signals, said wavelength band demultiplexer outputs~~ a downlink optical signal ~~input to the downlink optical signal receiving means~~ via the access section optical fiber and ~~having the wavelength corresponding to the ONU, the wavelength band demultiplexer outputting, to the access section optical fiber, an uplink optical signal output by the uplink optical signal transmitting means and further outputs an uplink optical signal generated by the uplink optical signal transmitting means to the wavelength multi/demultiplex apparatus via the access section optical fiber, the downlink optical signal and the uplink optical signal having the wavelength corresponding to the ONU.~~

7. **(Currently Amended)** An optical network unit (ONU) used in a wavelength-division multiple access system having a center apparatus (OLT), n ONUs, and m ONUs arranged via a wavelength multi/demultiplex apparatus, the OLT and the wavelength multi/demultiplex apparatus being connected together in a multiplex section via a multiplex section optical fiber, the wavelength multi/demultiplex apparatus and the ONUs being connected together in an access section via an access section optical fiber, downlink optical signals from the OLT to the ONUs and uplink optical signals from the ONUs to the OLT being transmitted through the multiplex section using wavelengths assigned to the respective ONUs while multiplexing the wavelengths, the wavelength multi/demultiplex apparatus carrying out wavelength multiplexing or demultiplexing for bidirectional transmissions, ~~characterized in that~~ wherein a wavelength band D_a (wavelengths λ_{d1} to λ_{dn}) for downlink optical signals corresponding to the n ONUs, a wavelength band U_a (wavelengths λ_{u1} to λ_{un}) for uplink optical signals corresponding to the n ONUs, a wavelength band D_b (wavelengths λ_{dn+1} to λ_{dn+m}) for downlink optical signals corresponding to the m ONUs, and a wavelength band U_b (wavelengths λ_{un+1} to λ_{un+m}) for uplink optical signals corresponding to the m ONUs are set different from one another, the wavelength bands U_a and U_b are set adjacent to each other, and the wavelength bands U_a and D_a or the wavelength bands U_b and D_b are set adjacent to each other, ~~and each of the ONUs comprises~~ the ONU comprising:

downlink optical signal receiving means for receiving a downlink optical signal of one of the wavelengths λ_{d1} to λ_{dn+m} in the wavelength bands D_a and D_b which wavelength is assigned to the ONU; and

uplink optical signal transmitting means for transmitting an uplink optical signal of one of the wavelengths λ_{u1} to λ_{un+m} in the wavelength bands U_a and U_b which wavelength is assigned to the ONU or an uplink optical signal within a broad band including the wavelength bands U_a and U_b .

8. **(Currently Amended)** An optical network unit (ONU) used in a wavelength-division multiple access system having a center apparatus (OLT), n ONUs, and m ONUs arranged via a wavelength multi/demultiplex apparatus, the OLT and the wavelength multi/demultiplex apparatus being connected together in a multiplex section via a multiplex section optical fiber, the wavelength multi/demultiplex apparatus and the ONUs being connected together in an access section via an access section optical fiber, downlink optical signals from the OLT to the ONUs and uplink optical signals from the ONUs to the OLT being transmitted through the multiplex section using wavelengths assigned to the respective ONUs while multiplexing the wavelengths, the wavelength multi/demultiplex apparatus carrying out wavelength multiplexing or demultiplexing for bidirectional transmissions, ~~characterized in that~~ wherein a wavelength band D_a (wavelengths λ_{d1} to λ_{dn}) for downlink optical signals corresponding to the n ONUs, a wavelength band U_a (wavelengths λ_{u1} to λ_{un}) for uplink optical signals corresponding to the n ONUs, a wavelength band D_b (wavelengths λ_{dn+1} to λ_{dn+m}) for downlink optical signals corresponding to the m ONUs, and a wavelength band U_b (wavelengths λ_{un+1} to λ_{un+m}) for uplink optical signals corresponding to the m ONUs are set different from one another, the wavelength bands U_a and U_b are set adjacent to each other, and the wavelength bands U_a and D_a or the wavelength bands U_b and D_b are set adjacent to each other, a connection is made to each ONU in the access section via two access section optical fibers, the OLT is configured to multiplex the ~~wavelengths of and transmit optical carriers for uplink signals~~ uplink optical carriers in the wavelength bands U_a and U_b (wavelengths λ_{u1} to λ_{un+m}) and downlink optical signals in the wavelength bands D_a and D_b (wavelengths λ_{d1} to λ_{dn+m}) and to transmit to the multiplex section optical fiber, the wavelength multi/demultiplex apparatus is configured to ~~separate the optical carriers for uplink signals and downlink optical signals of the wavelengths corresponding to the ONUs from the optical carriers for uplink signals and downlink optical signals input via the multiplex section optical fiber and to output the resultant signals to the ONUs via one of the access section optical fibers, while multiplexing the uplink optical signals input through the other access section optical fiber and having the wavelengths corresponding to the ONUs to output the resultant signals~~ demultiplex the uplink optical carrier and the downlink optical signal, each of the carrier and the signal having a wavelength corresponding to the ONU, from the multiplexed uplink optical carriers and the multiplexed downlink optical signals which are transmitted via the multiplex section optical fiber and to output the demultiplexed carrier and signal to each of the ONUs via one of

the access section optical fiber, and further, to multiplex the uplink optical signals transmitted via the other of the access section optical fiber, each of the uplink optical signal having a wavelength that corresponds to the ONU and to output multiplexed uplink optical signals in the wavelength bands Ua and Ub (wavelengths λ_{u1} to λ_{un+m}) to the multiplex section optical fiber, and each of the ONUs comprises the ONU comprising:

a wavelength band demultiplexer multiplexer which is characterized by separating separates the wavelength bands Ua and Ub for the uplink optical signals from the wavelength bands Da and Db for the downlink optical signals and which demultiplexes the optical carrier for the uplink signal from the downlink optical signal, the optical carrier for the uplink signal and the downlink optical signal being input via one of the access section optical fibers and having the wavelengths corresponding to the ONU separates an uplink optical carrier from a downlink optical signal which are transmitted via the one of the access section optical fiber, the uplink optical carrier and the downlink optical signal having a wavelength corresponding to the ONU; and;

downlink optical signal receiving means for receiving a downlink optical signal of one of the wavelengths λ_{d1} to λ_{dn+m} in the wavelength bands Da and Db which wavelength is assigned to the ONU; and

an optical modulator which operates as the uplink optical signal transmitting means for transmitting an uplink optical signal of one of the wavelengths λ_{u1} to λ_{un+m} in the wavelength bands Ua and Ub which wavelength is assigned to the ONU or an uplink optical signal within a broad-band including the wavelength bands Ua and Ub and which modulates the uplink optical carrier having the wavelength corresponding to the ONU separated by the wavelength band demultiplexer and then transmits the modulated signal to the other access section optical fiber.

9. **(Currently Amended)** An optical network unit (ONU) used in a wavelength-division multiple access system having a center apparatus (OLT), n ONUs, and m ONUs arranged via a wavelength multi/demultiplex apparatus, the OLT and the wavelength multi/demultiplex apparatus being connected together in a multiplex section via a multiplex section optical fiber, the wavelength multi/demultiplex apparatus and the ONUs being connected together in an access section via an access section optical fiber, downlink optical signals from the OLT to the ONUs and uplink optical signals from the ONUs to the OLT being transmitted through the multiplex section using wavelengths assigned to the respective ONUs while multiplexing the wavelengths, the wavelength multi/demultiplex apparatus carrying out wavelength multiplexing or demultiplexing for bidirectional transmissions, ~~characterized in that~~ wherein a wavelength band Da (wavelengths λ_{d1} to λ_{dn}) for downlink optical signals corresponding to the n ONUs, a wavelength band Ua (wavelengths λ_{u1} to λ_{un}) for uplink optical signals corresponding to the n ONUs, a wavelength band Db (wavelengths λ_{dn+1} to λ_{dn+m}) for downlink optical signals corresponding to the m ONUs, and a wavelength band Ub (wavelengths λ_{un+1} to λ_{un+m}) for uplink optical signals corresponding to the m ONUs are set different from one another, the wavelength bands Ua and Ub are set adjacent to each other, and the wavelength bands Ua and Da or the wavelength bands Ub and Db are set adjacent to each other, a connection is made to each ONU in the access section via one access section optical fiber, ~~and each of the ONUs comprises~~ the ONU comprising:

a wavelength band demultiplexer which is characterized by separating the wavelength bands Ua and Ub for uplink optical signals from the wavelength bands for downlink optical signals ~~and which outputs signals, said wavelength band demultiplexer outputs~~ a downlink optical signal input to the downlink optical signal receiving means via the access section optical fiber and having the wavelength corresponding to the ONU, to downlink optical signal receiving means, while outputting an uplink optical signal output by uplink optical signal transmitting means and further outputs an uplink optical signal generated by the uplink optical signal transmitting means to the wavelength multi/demultiplex apparatus via the access section optical fiber, the downlink optical signal and the uplink optical signal having the wavelength corresponding to the ONU, to the access section optical fiber;

downlink optical signal receiving means for receiving a downlink optical signal of one of the wavelengths λ_{d1} to λ_{dn+m} in the wavelength bands Da and Db which wavelength is assigned to the ONU; and

uplink optical signal transmitting means for transmitting an uplink optical signal of one of the wavelengths λ_{u1} to λ_{un+m} in the wavelength bands Ua and Ub which wavelength is assigned to the ONU or an uplink optical signal within a broad band including the wavelength bands Ua and Ub.